



FAA-C-1244 b

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SUPERSEDING

FAA-1244a, 1/20/60

# DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION SPECIFICATION

## INSTALLATION OF ENGINE-GENERATORS AND FUEL TANKS

### 1. SCOPE

1.1 Scope.- This specification covers the requirements of the Federal Aviation Administration for the installation of Government-furnished engine-generator(s), fuel tank(s) and associated equipment for the National Airspace System.

### 2. APPLICABLE DOCUMENTS

2.1 FAA Specifications.- The following FAA specifications, of the issues specified in the invitation for bids or request for proposals, form a part of this specification and is applicable to the extent specified herein:

CAA-566	Concrete
FAA-C-1217	Electrical Work, Interior

### 2.2 FAA Drawings

A-4860-3, -4, -6	Automatic Louvers, 20", 24", 42"
C-2134	20" Propeller Fan
C-3317-8	Exhaust Opening for Prefabricated and Masonry Type Buildings for Engine-Generators
C-3871-1	Sectional Battery Rack for Engine-Generators, Rack Assembly

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C-3871-2

Sectional Battery Rack for Engine-Generators, Rack Details

2.2 FAA Drawings continued

D-4573-2

Hood - 42", Shop Details

C-4794-6

Installation of Flexible Air Duct for Engine-Generators 25 KVA and smaller

C-4794-10

Installation of Flexible Air Duct for Engine-Generators 37.5 to 75 KVA

D-5173

Installation of Hoods and 20" Fan

D-5560

Screens for Ventilation Hoods

D-5586-1-2

Hood - Type HV-1A, HV-2A

D-5637

30 KW and 50 KW Load Bank, Installation in 42" Hood, Masonry Type Building

D-5658

30 KW and 50 KW Load Bank, Installation in 42" Hood - Type S, SC, and SD Building

D-2111-1

Fuel Tank Installation, Underground, Gasoline and Diesel

D-5043

280 Gallon Fuel Storage Tank

D-562

515 Gallon Fuel Storage Tank

D-5110

1000, 2000, 3000 Gallon Fuel Storage Tank

D-5524

Engine-generator, Typical Diagramatic Layout

2.3 Military and Federal publications.- The following Military and Federal publications of the issues in effect on the date of the invitation for bids or request for proposals form a part of this specification and are applicable to the extent specified herein.

2.3.1 Military specification

MIL-P-15147

Primer and Enamel, Coal Tar

2.3.2 Federal specifications

HH-I-570

Insulation, Thermal, Asbestos Felt, for Temperature up to 1000° F

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TT-E-489	Enamel, Alkyd Glass (for exterior and interior surfaces)
TT-P-28	Paint, Aluminum, Heat Resisting (1200° F)
TT-P-636	Primer Coating, Alkyd, Wood and Ferrous Metal
WW-P-406	Pipe, Steel (seamless and welded) (for ordinary use)
WW-P-521	Pipe Fittings, Flange Fittings, and Flanges, Ferrous and Steel, (Screwed and Butt-welded) 150 pounds
WW-T-799	Tube, Copper, Seamless, (for use with solder type or flared-tube fittings)

2.4 Other Publications.- The following publications, of the issue in effect on the date of the invitation for bids or requests for proposals, forms a part of this specification and is applicable to the extent specified herein.

National Electrical Code

NFPA No. 70

National Fire Code

NFPA Nos. 30 and 58

Copies of the foregoing documents may be obtained as follows:

(Copies of this specification, other applicable FAA specifications, Standards, and FAA drawings may be obtained from Federal Aviation Administration Office issuing the invitation for bids, request for proposals, or contract, Attention: Contracting Officer. Requests should fully identify material desired, i.e., specification, standard, amendment, and drawing numbers and dates. Requests should cite the invitation for bids, request for proposals, or the contract involved, or other use to be made of the requested material).

(Information on obtaining copies of Federal specifications and standards may be obtained from General Services Administration offices in Washington, D. C., Seattle, San Francisco, Denver, Kansas City, Mo., Chicago, Atlanta, New York, Boston, Dallas, and Los Angeles.)

(Single copies of Military specifications and standards may be obtained from Federal Aviation Administration, Washington, D. C. 20590, Attention: Contracting Officer. Requests should cite the invitation for bids, request for proposals, or contract involved, or other use for which the material is needed. Mail requests, if found acceptable, will be forwarded to a military supply depot for filling, hence, ample time, for delivery, should be allowed.)

(Copies of the National Electrical Code and National Fire Code may be obtained from National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts 02110).

In the event of conflict between this specification and other specifications and standards referenced herein this specification shall govern.

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### 3. REQUIREMENTS

3.1 General.- When specified in the proposal, the contractor shall furnish all labor, equipment, transportation, and other facilities to complete the installation of the engine-generator(s), fuel tank(s), and associated equipment.

3.2 Care and handling.- The contractor shall provide protection for the engine-generator(s) and associated equipment from the weather, dust, and physical damage. He shall also be liable for all damage while transporting or handling the engine generator(s), associated equipment, and to the building while installing same until final inspection and acceptance.

### 3.3 Materials and workmanship

3.3.1 General.- The rules, regulations, and reference specifications enumerated herein shall be considered as minimum requirements. They shall not relieve the contractor from furnishing and installing higher grades of material and workmanship than are specified herein or when so required by the specification drawings.

3.3.2 Materials.- Where the drawings indicate, (diagrammatical or otherwise) the work intended and the functions to be performed (even though some minor details are not shown) the contractor shall furnish all equipment and materials other than government furnished items listed in the Construction Proposal. The contractor shall be responsible for taking the necessary actions to insure that all equipment, material, and installation work are coordinated with, and are compatible with the architectural, electrical, mechanical, and structural plans. All materials and equipment to be acceptable, shall comply with all contract and proposal requirements. Materials furnished by the contractor under this specification shall be new and the standard product of the manufacturer's latest designs that comply with the specification requirements. Wherever standards have been established by Underwriters Laboratories, Inc., the materials shall bear the UL Label.

Minor departures from exact dimensions shown in the drawings are permitted where required to avoid conflict or unnecessary difficulty in placement of the dimensioned item, provided all other contract and proposal requirements are met, however, the contractor shall promptly notify the FAA Contracting Officer of any such departure.

3.3.2.1 Contractor's responsibility to government furnished materials.- When materials furnished by the Government are turned over to the contractor, it shall be the contractor's responsibility to check the materials, to see that they are in good condition and that the quantities are sufficient to accomplish the installation required. Should the contractor find that the quantities of the items listed as being furnished by the Government are not sufficient, he shall immediately notify the Government representative in writing, so that additional quantities may be obtained without delaying the completion of the installation. After the contractor has accepted the materials from the Government representative, all materials lost or damaged will be replaced or paid for by the contractor.

The contractor will be responsible for providing suitable storage space for all government furnished equipment required to complete the installation. Indoor

storage space shall be provided by the contractor, for all equipment which may be damaged if exposed to the elements, out-of-door space will be acceptable for other items which will not be damaged if stored outside.

It shall be the contractor's responsibility to account for all material delivered to him by the government. His final report to the Government representative shall include a list of all government equipment incorporated in the job and all government equipment remaining after completion of the work. The total shall be the total of the equipment received by him from the government.

Materials and equipment furnished by the government in excess of that required to complete the installation shall be returned to the Government representative upon completion of the installation.

Upon completion of the contract, if required by the Government representative, the contractor shall carefully pack and crate all surplus government furnished materials in a manner suitable for freight shipment and deliver same to the freight depot designated by the Government representative.

3.3.3 Workmanship.- All installation work shall be done by competent and experienced mechanics regularly engaged in this type of work in conformance with established standards. When required by local government the workman shall have a current license to engage in this type of work.

### 3.4 Installation

3.4.1 General.- This specification includes the installation of all mechanical and electrical items required for the proper operation of a government furnished engine-generator set, fuel tank, and accessories. The items to be installed shall include the engine generator set, fuel storage tank and piping, engine exhaust system, radiator air duct, when required, load bank, battery rack, batteries, entrance and bypass (isolation) switches, etc.

Installations using a fuel supply requiring an above-ground tank(s), natural gas, or liquified petroleum gas shall be as specified in the invitation for bids or request for proposals and in accordance with National Fire Code Standards, NFPA Nos. 30 and 58.

### 3.4.2 Engine-generator installation

3.4.2.1 Mounting.- The engine-generator bedplate shall be mounted on not less than six (6) vibration pads or as shown on the engine-generator installation drawing. The pads shall be neoprene,  $4\frac{1}{2}$  inches by 6 inches, not less than  $\frac{5}{16}$  inch nor more than  $1\frac{1}{8}$  inches thick, grooved longitudinally. The grooves on the top surface shall be at right angles to the grooves on the bottom surface. In the event the bedplate is not uniformly supported by the vibration pads the contractor shall shim between the bedplate and the pad to insure proper support.

### 3.4.3 Engine exhaust system.

3.4.3.1 Exhaust silencer.- When specified, the contractor shall install the government furnished exhaust silencer (muffler) on engine-generator sets,

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60KW (75KVA) and smaller, in the engine-generator room. The muffler, when in place, shall not extend more than 30 inches beyond the front of the engine radiator (see FAA Drawing D-5524). When installed in the engine-generator room the muffler shall be covered with a minimum of  $1\frac{1}{2}$  inch pipe insulation, calcium silicate thermal insulation, (J-M Thermobestos or equal). Mufflers installed outside the building will not require covering, however, the rigid portion of the exhaust pipe, inside the building, when specified, shall be covered with the same type and thickness of thermal insulation.

3.4.3.2 Exhaust pipe.- The engine exhaust pipe furnished by the contractor shall be black steel pipe conforming to Federal Specification WW-P-406, Weight A, Class 1, threaded to accommodate the threaded flanged couplings furnished with the exhaust silencer (muffler) and flexible metal, exhaust pipe. The exhaust pipe shall be run through the wall of the building and supported as shown on the engine-generator installation drawing. Metal plates or a metal sleeve as indicated on FAA Drawing C-3317-8 shall be installed where the exhaust pipe passes through the wall of the building. Where metal plates are used, a layer or layers of fireproof vibration absorbant material, not less than  $1/8$  inch thick, conforming to Federal Specification HH-I-570, shall be placed between the plates and the wall. The exhaust pipe exit shall be waterproofed. The exhaust piping and the muffler, when not covered, shall be painted with a heat resistant aluminum paint conforming to Federal Specification TT-P-28.

3.4.3.3 Exhaust pipe rain cap.- When the engine exhaust pipe terminates in a vertical run, and when specified, the contractor shall furnish and install an exhaust pipe rain cap (rain shield, or flapper valve) commensurate to the exhaust pipe diameter.

3.4.3.4 Exhaust pipe hangers.- Exhaust pipe hangers (support straps), of the cross sectional area indicated on the engine-generator installation drawing, shall be used to support all overhead exhaust piping. The hangers shall be spaced as indicated on the drawing but in no case more than six feet apart on straight runs of pipe and not more than 12 inches from each change in direction of the exhaust pipe.

3.4.4 Engine cooling system.- In order to prevent damage to the engine immersion heater, the contractor shall fill the cooling system before the set is connected to the commercial power. When required, a sufficient amount of ethylene glycol type anti-freeze, to protect the engine from freezing down to 10°F., and an approved rust inhibitor, shall be added to the cooling water.

3.4.4.1 Radiator air duct. The contractor shall install the flexible air duct from the engine radiator to the wall opening with all necessary hardware in accordance with FAA Drawing C-4794-6 for engine-generators 25 KVA and smaller and FAA Drawing C-4794-10 for engine-generators 37.5 KVA to 75 KVA. Engine-generators larger than 75 KVA, unless otherwise specified, will have outdoor radiators, in which case, a flexible air duct will not be required. Where an outdoor radiator is required, a concrete pad for mounting the radiator shall be furnished and installed by the contractor as specified under Paragraph 3.4.8.3.1 of this Specification.

3.4.5 Fuel storage tank.- The contractor shall furnish a steel fuel storage

tank for underground installation, of the capacity indicated on the drawings. The tank(s) shall comply with the applicable requirements of the National Fire Code, NFPA No. 30 and shall be so labeled by the Underwriters' Laboratories, Inc. The tank(s) shall have the number and size openings as indicated on the applicable FAA tank drawing. The exterior of the tank shall have been factory-painted with a coat of red lead primer and two coats of asphaltic enamel.

3.4.5.1 Fuel storage tank installation.- The installation of the fuel storage tank(s), fuel line fittings, and vent lines shall conform to the applicable requirements relating to underground tanks contained in Fire Code Standard NFPA No. 30 and as shown on FAA Drawing D-2111-1. Before burial of the fuel storage tank(s) all surface areas from which factory coating has been abraded shall be thoroughly cleaned and given a coat of coal-tar enamel conforming to Military Specification MIL-P-15147, Primer and Enamel, Coal Tar, applied hot, to a dry thickness of not less than 1/16 inch. When specified in the proposal, to prevent floating, the tank shall securely anchored to a concrete pad as indicated on FAA Drawing D-2111-1. Earth backfill shall be placed around and over the tank and be firmly tamped.

3.4.5.2 Fuel lines.- The contractor shall connect the supply, return, and carburetor overflow (where required) copper fuel lines to the engine fuel bracket and install the fill and vent pipes as shown on FAA Drawing D-2111-1. The fuel lines shall be 3/8 inch O.D. soft annealed seamless copper tubing, Type K, Class 1, conforming to Federal Specification WW-T-799. All tube fittings shall be cast bronze or brass of the flared type. The tank fill and vent piping shall be galvanized steel pipe conforming to Federal Specification WW-P-406, Weight A, Class 2. All pipe fittings shall be galvanized, malleable iron, conforming to Federal Specification WW-P-521, Type II except as specified on FAA Drawing D-2111-1. The locking type fill cap shall be waterproof and painted in accordance with the NOTE on FAA Drawing D-2111-1. The tubing and piping outside of the building shall be run underground and shall be so laid as to pitch toward the supply tank without traps. Testing of the tank and piping shall be in accordance with the NOTE on FAA Drawing D-2111-1.

3.4.5.3 Fuel supply.- For gasoline engine generators 25 KVA and smaller, the contractor shall fill the fuel storage tank with 50 gallons of standard commercial grade (non-premium) gasoline of not less than 82 octane rating. For sets larger than 25 KVA, the amount shall be 100 gallons. Where the set is diesel operated, like amounts of No. 2 Diesel fuel of not less than 40 cetane rating shall be supplied.

3.4.5.4 Auxiliary fuel pump.- When specified, the contractor shall furnish and install an electric driven, auxiliary fuel pump to provide additional pressure where the suction lift is in excess of 9 feet from the base of the tank to the engine bedplate at sea level or where additional lift is required due to the elevation of the engine-generator installation. The pump may be AC or DC operated. If AC operated it shall be provided with a non-magnetic starter, overload protection, and be adequately fused. It shall be installed so that the starter is connected after the generator and before the generator circuit breaker to operate when the generator is running. If the auxiliary fuel pump is DC operated it shall be connected to the engine starting batteries so as to operate only when the engine is running. It shall have overload protection and be properly fused. Where required by state or local regulations the auxiliary fuel pump shall be explosion-proof.

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The pump shall be connected into the fuel supply line either before or after the first fuel filter, on diesel engines; preferably after, if fuel line configuration permits, to protect the pump from abrasive contaminants.

3.4.5.5 Auxiliary fuel tank.- When specified, due to a requirement of excessive suction lift or site elevation, an additional auxiliary fuel tank (day tank) and necessary piping shall be installed by the contractor to provide an immediate supply of fuel close to the engine for quick starting. The capacity and location of the tank shall be as specified in the invitation for bids or request for proposals.

3.4.6 Wiring.- The contractor shall install all switches, breakers, distribution panels and control cabinets, as required, in the engine-generator room. He shall run all conduits, lay-in-duct, and wiring between the entrance switch or breaker, bypass (isolation) switch, generator control cabinet, distribution panel(s), load bank, and load bank control cabinet, and starting batteries in accordance with the installation drawings. The wiring shall conform to Specification FAA-C-1217, Electrical Work, Interior. The generator frame and generator control cabinet shall be grounded in accordance with Specification FAA-C-1217. The contractor shall identify all switches and cabinets by stenciling on the front of each item of equipment, with a one inch stencil, or smaller if necessary, the voltage, phase, and function of the piece of equipment.

3.4.7 Starting batteries.- When specified, dry charged batteries, with electrolyte in separate containers, will be furnished by the Government. Several hours before starting the set, or when so ordered by the resident engineer, the contractor shall place the appropriate amount of electrolyte in the battery cells in accordance with the battery manufacturer's instructions and place on charge.

3.4.7.1 Battery rack.- The contractor shall procure or fabricate the number of battery rack sections indicated on the installation drawings, in accordance with FAA Drawing D-3871-2, and assembled as indicated on FAA Drawing D-3871-1. The battery rack shall be positioned in place as indicated on the engine-generator installation drawing and the batteries interconnected. Sand trays will not be required. The contractor shall make certain that the battery connections are not reversed so as to prevent damage to the charging rectifier and battery charging ammeter. Consult the engine-generator wiring diagram for battery voltage of engine starting motor.

CAUTION: BEFORE CONNECTING THE BATTERY CIRCUIT, BE SURE THAT THE EMERGENCY STOP AND LOCKOUT SWITCH IS IN THE "OFF" POSITION.

#### 3.4.8 Load bank

3.4.8.1 General.- When required, load banks will be Government furnished. The contractor shall install the load bank, of the size indicated in the invitation for bids or request for proposals, as shown on the engine-generator installation drawing, together with the associated equipment including all conduit, conductor, and fittings.

3.4.8.2 Load banks, 30KW and 50KW.- Where load banks are specified for engine-generators 37.5 KVA through 75 KVA the contractor shall install the load

bank in the 42 inch engine exhaust hood in accordance with FAA Drawings D-5637, for masonry type buildings, and D-5658 for prefabricated type buildings.

3.4.8.3 Load banks, 100KW and larger.- Load banks, 100KW and larger, when required, will be the outdoor type with a switching (control) cabinet in the engine-generator room as shown in the engine-generator installation drawing.

3.4.8.3.1 Mounting pad.- The contractor shall construct and install a reinforced concrete pad with a minimum strength of not less than 2500 psi for mounting the outdoor load bank enclosure. The concrete shall conform to Specification CAA-566. Pad dimensions will depend upon the type and size of the enclosure furnished. The pad shall be not less than 6 inches larger than the load bank enclosure on all sides. The pad shall have a minimum thickness of at least 6 inches and be installed with not more than 2 inches of the pad above the finished grade. The reinforcing mesh shall be a minimum of 6 X 6 - 10/10 WWF, located not less than 3 inches below the top of the pad. The securing of the load bank enclosure to the concrete pad, if required, shall be as specified in the invitation for bids or request for proposals.

3.4.9 Paint touch up.- The contractor shall touch up all rust spots and scratches on the engine-generator and associated equipment. Rusted areas shall be sanded down and primed with Primer Coating, Alkyd, Wood and Ferrous Metal conforming to Federal Specification TT-P-636. The areas shall then be painted with Alkyd Gloss Enamel conforming to Federal Specification TT-E-489, matching the existing paint on the engine generator and associated equipment, as near as is possible.

#### 4. QUALITY ASSURANCE PROVISION

4.1 General.- The instructions relative to the installation, and of the placing in operation, of the engine-generator set(s) as contained in the Operator's Manual or Instruction Book, furnished with the set, shall be followed. The spare parts, special tools, and Instruction Book, furnished with the set, shall be left in the engine-generator room.

4.2 Phase rotation.- On three phase engine-generator sets the contractor shall make certain that the phase rotation of the generator is compatible with that of the incoming commercial lines or with a second engine-generator where the installation is "prime power" design.

4.3 Preparation for test.- The contractor shall connect the engine-generator sets, ready to operate, fill the crankcase with the correct grade of oil, fill cooling system, Paragraph 3.4.4, and fuel tank, 3.4.5.3, as directed this specification and notify the resident engineer when the set is ready for operation. contractor shall not attempt to start the engine-generator for the first time until the installation has been completely checked for starting by a representative of the Federal Aviation Administration. The contractor shall have a representative present during this test and shall perform any necessary labor, except that required to correct deficiencies in Government furnished materials, and shall demonstrate, by means of operational tests, designated by a representative of the Federal Aviation Administration, that the system, including the bypass switch, load bank, and associated equipment is complete and operational.

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5. Preparation for delivery  
(not applicable)

6. Notes

6.1 None

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